REMARKS/ARGUMENTS

In consideration of the Examiner's comments, the independent Claims 1, 8, 34, and 39 are amended to clarify the process by which the present invention utilises measured physical proportions of a gem stone to determine corresponding values of attributes contributing to visual appeal. The claims have also been amended to remove reference to "subjective beauty and desirability", in view of the Examiner's concerns regarding the indefinite nature of this term.

In particular, the amended claims explicitly recite methods, systems, and computer software products, according to which the values of a plurality of attributes contributing to visual appeal of a gem stone are determined by, for each attribute:

- selecting *at least three* objective parameter values relating to measured physical proportions of the gem stone; and

- using these selected objective parameter values *in combination* to determine the attribute value *on the basis of predetermined consumer preferences* which have been established taking into account the effect of *an inter-relationship amongst all of the selected objective parameter values.*

Additionally, the amended claims clarify that the assessment of the beauty and desirability of the gem stone is not "subjective" in the broad sense suggested by the Examiner in his rejection under 35 USC 112, but rather is defined relative to the predetermined consumer preferences. In this respect, the Examiner's acknowledgement that the term "predetermined consumer preferences" is not understood as subjective with regard to the present application is appreciated, and he is thanked for his clear expression of his reasoning. As the Examiner has noted, the assessment of beauty and desirability is concrete, tangible and repeatable relative to any particular set of established consumer preferences, as described in the specification and now clearly defined in the claims. It is agreed that there should be no need to use the term "subjective" in the claims, thereby avoiding the possible inference, as raised by the Examiner, that this term may relate to the preferences of the individual user, rather than to the predetermined body of consumer preferences.

Additional to the amendments in the independent claims, minor consequential amendments have also been made to Claims 21 and 29.

Rejections under 35 USC 112

As noted above the term "subjective beauty and desirability", which forms the basis for the Examiner's rejections under 35 USC 112, has been eliminated from the amended claims. It is believed that this ground for rejection may be withdrawn.

Rejections under 35 USC 103

The Examiner has maintained, *verbatim*, all of the rejections under 35 USC 103 originally set out in the previous Official Action. It is submitted that the claims as presently amended patentably distinguish the invention from the cited prior art.

Specifically, Claim 1 defines a method of providing a user with an assessment of a gem stone which includes using at least three selected objective parameter values *in combination* to determine each one of a plurality of attribute values based upon *predetermined consumer preferences*, which have been established taking into account the effect of an *inter-relationship amongst all of the selected objective parameter values*.

The Examiner contends that Malnekoff (US patent no. 6,304,853) discloses the use of "at least three" gem stone proportions (*ie* objective parameter values), referring particularly to Claims 1 and 14 therein. While Malnekoff indeed discloses and claims the use of "at least two" such gem stone proportions, Malnekoff does not disclose the use of such values *in combination*, nor the use of such a combination to determine any attribute value on the basis of established predetermined consumer preferences which take into account an *inter-relationship* amongst *all* of the selected objective parameter values. The italicized words, which appear in the presently amended claim, clearly define patentably distinguishing features of the present invention.

In particular, the amended Claim 1 clearly recites the conversion of measured physical proportions (*ie* the objective parameter values) of a gem stone into visual appeal attribute values. Furthermore, the claim recites the importance of using groups of at least three such objective parameter values explicitly in combination in order to account for the complex inter-relationships that may exist between the parameters, which contribute to established consumer perceptions of visual appeal. This particular use of three or more proportional parameters as a means for establishing a rating value is not disclosed or remotely suggested by Malnekoff.

We refer in particular to the passage in Malnekoff commencing at column 4 line 46, and ending at column 5 line 26, in which the use by Malnekoff of at least two cut proportion

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data values is disclosed. In accordance with the method of Malnekoff, a baseline price estimate is first established based upon cut type, weight, color and clarity, followed by the application of a variable jeweller pricing adjustment which is based upon current market conditions (column 4 lines 46 to 57). It is notable that, to this point, Malnekoff makes no use of cut proportions. Malnekoff then goes on to explain between column 4 line 58 and column 5 line 5, the influence of other gem stone characteristics, and particularly cut proportions, on gem stone pricing.

According to Malnekoff (column 5 line 6 to column 5 line 26) cut proportions are then taken *sequentially and independently* in order to apply a further price adjustment. This sequential and independent approach is common in the prior art and, and according to the present invention, is based upon an overly-simplistic understanding of the mechanisms by which cut proportions affect visual appearance.

More particularly, according to Malnekoff each cut proportion data value (such as depth percentage or table percentage) is considered separately, and in turn, and is compared with a corresponding "ideal" value. At best, a cut proportion value may conform to the "ideal" in which case no price adjustment is applied. Any deviation from the " ideal" results in a negative adjustment.

For example, at column 5 line 6 to column 5 line 11 Malnekoff describes depth percentage, and identifies the corresponding "ideal" as being 58 percent. At column 5 lines 12 to 18 Malnekoff describes table percentage, and states that the corresponding "ideal" value is around 56 percent. The independence of the adjustments applied by Malnekoff is made expressly clear at column 5 lines 19 to 21, wherein it is stated that " as the value of the depth percentage **or** the table percentage of a gem stone varies from the ideal cut the amount of the adjustment will vary in a negative direction".

Malnekoff thus clearly discloses that cut proportion values are to be considered separately, and that the only possible effect of any deviation in any individual value from its corresponding "ideal" is a reduction in price. Multiple deviations from the so called "ideal" arising in multiple cut proportion values necessarily result in cumulative negative price adjustments.

By contrast, the present invention, as recited in Claim 1, expressly requires that objective parameter values relating to measured physical proportions of a gem stone be considered in groups of at least three, such that the *inter-relationships* arising between

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different cut proportions may be accounted for in determining values for visual appeal attributes. While Malnekoff implicitly assumes that all deviations from "ideal" values result in a reduction of visual appeal, the present invention is able to account for the fact that many combinations of cut proportions which do not conform to a single fixed "ideal" may result in visually appealing gem stones. According to the invention defined in Claim 1, predetermined consumer preferences are established which take in to account the effect of such inter-relationships upon visual appeal, and these are used to enable the invention to provide a concrete, tangible and repeatable assessment of the gem stone relative to the predetermined consumer preferences. Malnekoff does not disclose or suggest such an approach, and there is nothing in the disclosure that would suggest the importance of considering inter-relationships between multiple cut proportion values, or a mechanism for taking into account predetermined consumer preferences which vary from those represented by the "ideal" cut proportions.

The Examiner further relies upon Rubin (US patent no. 4,527,895) in rejecting Claims 1 to 4, 6 to 11, 13 to 14, 26 to 28, 34 to 36 and 39 on grounds of obviousness. Rubin relates to a method of providing an accurate, objective and readily reproducible characterisation of the total colored appearance of a gem stone (abstract). In particular, Rubin discloses an objective color designation divorced from any consideration of the relative visual appeal of any one gem stone color over another. It should be noted that while color may be a relevant factor to a given individual consumer when selecting a gem stone, and the popularity or otherwise of particular colors may accordingly affect price (see, eg Malnekoff column 4 line 50), the present invention is concerned with assessing the effect of cut of a gem stone, independent of color.

Since Rubin does not remotely disclose or suggest a method of assessing a gem stone which includes selecting groups of at least three objective parameter values relating to measured physical proportions, and using these in combination to provide an assessment of the gem stone relative to predetermined consumer preferences taking into account inter-relationships amongst the members of the selected groups, it is clear that Rubin does not supply the features of the present invention that are deficient in Malnekoff.

Accordingly, it is submitted that Claim 1 is patentable over Malnekoff in view of Rubin. The further independent Claims, 8, 34 and 39 all include the salient features of amended Claim 1, and it is submitted that these claims are also patentable over Malnekoff in

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view of Rubin. Claims 2 to 4, 6 to 7, 9 to 11, 13 to 14, 26 to 28 and 35 to 36 all depend from the aforementioned independent claims, and include all the limitations thereof, and for this reason at least are patentable over Malnekoff in view of Rubin.

The Examiner has further rejected Claims 21 to 25, 29 to 33 and 37 to 38 as being unpatentable over Malnekoff in view of Rubin, as applied to Claims 1, 8 and 34, and further in view of Shannon (US patent no. 5,966,673).

Claims 21 to 25 depend either directly or indirectly from independent Claim 1, Claims 29 to 33 depend either directly or indirectly from Claim 8, Claim 37 depends from Claim 34, and Claim 38 depends from Claim 1. Accordingly, these claims include all of the limitations of their respective independent claims, and are therefore patentable over Malnekoff in view of Rubin.

Shannon relates to a system and method for computerised grading of the cut of a gem stone. In particular, Shannon discloses a computer simulation method based upon the well-known technique of optical ray tracing for establishing the objective optical characteristics of a gem stone. Specifically, a complete model of the gem stone to be evaluated is first constructed, and "illuminated" within a virtual environment using an appropriate illumination model. Ray tracing is used to predict the propagation of light within the gem stone model, and a camera model is used to "measure" the light exiting the gem stone. A grade is then calculated based upon the light exiting the stone.

Accordingly, Shannon discloses essentially a virtual measurement of total optical performance of a gem stone that is directly analogous with, and equivalent to, a corresponding physical measurement of an actual gem stone. This approach has certain advantages, including the ability to perform "measurements" on non-existent gem stones, or stones that have yet to be cut, as well as enabling results to be obtained that are not influenced by the uncertainties inherent in any practical real measurement system. However, Shannon essentially contributes nothing new with regard to the assessment of the resulting optical properties relative to consumer preferences. It is noted that the present application already acknowledges the importance of both actual and virtual evaluation of optical performance in devising suitable consumer preference data. In particular, given a suitable basis for evaluating consumer preferences, computer simulation may be used to assist in the population of corresponding lookup tables (Claim 30) or to interpolate data on demand

(Claim 32), although it should be noted that this latter approach requires significant computational effort, and thus may be impractical in most circumstances.

Shannon, however, does not disclose or suggest any relationship between virtual diamond analysis and the establishment of consumer preference data, as a means of gem stone assessment. Shannon establishes values for visual attributes based upon technical (*ie* mathematical and/or physical) properties of light propagation, without any reference to consumer preferences. In all cases, the methods and systems disclosed in Shannon necessarily perform a full optical simulation of light propagation within a gem stone, but ultimately provide no basis for assessing the gem stone relative to predetermined consumer preferences.

By contrast, in accordance with the present invention and assessment of the beauty and desirability of a gem stone is provided, relative to predetermined consumer preferences, based upon rating values that are related to input gem stone proportions via consumer preference data established by reference to the effect, upon visual appeal attributes, of selected groups of inter-related cut proportions. These defining features of the present invention are neither disclosed nor suggested in Shannon, either alone or in combination with Malnekoff and/or Rubin.

It is therefore believed that Claims 21 to 25, 29 to 33 and 37 to 38 in particular, are patentable over Malnekoff in view of Rubin, and further in view of Shannon.

In view of the above, it is submitted that all of the claims as presently amended define subject matter that is patentable over each of the cited references, whether considered singly or in combination. However, if the Examiner believes that further issues remain, it is

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requested that he telephone the undersigned at 260-460-1692 so that any unresolved matters can be worked out without the necessity for issuing a further formal Office Action.

Respectfully submitted,

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